DIET VALUES AND THE FOOD CONSUMPTION OF NEW ZEALAND FALCONS

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Abstract

Five diets were fed to two captive New Zealand Falcons over 12–14-day periods. The smaller male consumed 10.6–15.3 percent by body weight compared to the female's consumption of 8.2–13.0 percent. It was found that 100 g of whole mice were equivalent to 120 g of whole small birds, 132 g of lean hare muscle, 150 g of whole day-old turkey chicks, 151 g of rabbit meat, or 226 g of whole rabbit.

Introduction

The diet of the New Zealand Falcon (*Falco novaeseelandiae*) includes small-to-medium-sized birds and introduced mammals such as European hare (*Lepus europeaus*), rabbit (*Oryctolagus cuniculus*), and house mouse (*Mus musculus*). In order to estimate the annual toll taken by a pair of falcons on the prey animals within their hunting range, the food requirements of the falcons must be found.

Ambient temperature, size of raptor, its exercise, molt, reproduction, fat reserves, and diet types all affect the nutritional requirements. Fevold and Craighead (1958) found that the ratio of food consumed by three captive Golden Eagle (*Aquila chrysaetos*), expressed as a percent of their mean body weight, varied inversely with respect to both the mean body weight of the individual bird and the environmental temperature. They found that exercise did not increase food requirements to a great extent. Although a fat raptor can maintain body weight for some time by living on fat reserves (Mavrogordato 1960:46), metabolic drains such as molt and egg production will increase food requirements by an unknown extent.

Craighead and Craighead (1969) and Fevold and Craighead (op cit) did not place much emphasis on the type of food fed. But different diets, as pointed out by Beebe and Webster (1964:252) have different food values, and so the measurement of consumption of an artificial diet, such as beef (Wing and Wing 1939), cannot directly be used to make assumptions on natural food consumption.

By reducing other variables to a minimum, the following experiment was designed to investigate further how different diets affect food requirements. There has been no intent to imply that the chemical requirements of the falcons have been supplied as attempted by Bird and Ho (1976).

Method

Two captive nonreproductive, nonmolting juvenile New Zealand Falcons, a large male from North Canterbury and a small female from the Tararuas, North Island, were studied during the autumn and spring of 1976. These two periods provided temperatures midway between summer and winter temperatures. The falcons were maintained at slightly above their falconry 'flying weight' and with little or no fat reserves

so that changes in food intake resulted in corresponding fluctuations in body weight. The two individual falcons were known, from measurements of six captive falcons, to have normal appetites. During the day the falcons were tethered to block perches outdoors, and at night or during extremes of bad weather they were tethered indoors in an unheated room. The door of the room was left open during the day, and the maximum and minimum temperatures of the room were taken daily. The falcons were not exercised during the experimental periods but were flown in between periods to keep them reasonably fit. Five diets were fed to the falcons, each diet for a 12–14-day period. The diets were lean hare muscle, whole rabbit, whole day-old domestic turkey chick, whole mouse, and whole small (10–90 g) birds. The turkey chicks were intended to represent fledgling small birds taken in the wild; to what extent this approximation is correct is unknown. Owing to supply difficulties all food was stored deep-frozen and thawed to room temperature before feeding. This procedure may have lowered the food value slightly.

Food was thrown to the falcons near their blocks, and they were allowed to feed undisturbed; there were no noticeable differences between captive and wild feeding behaviors. When a whole prey animal had to be divided to reduce it to the correct meal weight, the remaining portion was fed to the same falcon on the next day in order to maintain a balanced whole animal diet.

Each diet was given 2–3 days before the experimental period began in order to prevent possible carry-over from the previous diet. One meal per day was given in precalculated amounts, weighed immediately before feeding. The falcons ate all parts of all meals, except 1–2 g of plucked feathers from small birds and larger items from the rabbit diet. I did not collect small bird remains, but rabbit remains were collected, weighed, and subtracted from the meal weight. The extent to which the falcons utilized a whole rabbit carcass is shown in table 1.

Table 1. Utilization of whole rabbit by falcons.

	Weight (g)	% of body weight
Rejected gut	250	16.7
Rejected skin, bones, etc.	224	15.0
Pellets	24	1.6
Consumed meat	998	66.7
Total rabbit	1496	100.0

Pellets, while having no value nutritionally, were probably essential to maintain long-term digestive "tone," and therefore pellet weight was not subtracted from meal weight.

The falcons and their food were weighed on a single beam balance accurate to 1 g. They were kept within 5 g of their set weight throughout the experimental period and finished each diet period at exactly the same weight at the same time of day as at the start.

Results

The results are shown in table 2. Mean temperature varied by 3.5°C between different diet periods, and this variation could affect comparisons because food requirements increase inversely with temperature. Craighead and Craighead (op. cit.) found

that for a male Cooper's Hawk (*Accipiter cooperii*) weighing about 300 g the food requirements increased by approximately 1 percent of the body weight for each 4.6°C drop in temperature, within normal annual temperature fluctuations. Therefore in order to make comparisons between diets, the food consumptions of the falcons were corrected on this scale to 10°C.

Discussion

The proportion of each meal that was later ejected as a pellet was much the same with each diet, except for lean hare muscle. Indigestible material was greatest in the whole bird diet but probably caused only a slight increase in meal weight.

Mean food values were expressed as equivalents to 100 g of whole mouse, which had the highest food value. Food values correlated well between the two falcons but would have been more accurate if it had been possible to arrange longer experimental periods.

If the weight of whole rabbit is considered (table 1) rather than just the weight consumed, the 221 g of whole rabbit are equivalent to 100 g of whole mouse.

As expected, the smaller male had a consistently higher (mean = 13.5) percent body weight food requirement than the female (mean = 11.1 percent). Different diet types altered the food requirements considerably although possibly less than most writers on falconry suggest. Woodford's (1960:127) claim that Woodpigeon (*Columba palumbus*) has twice the food value of rabbit is probably too generous unless considered as whole animal values.

Three steps are involved in estimating the annual toll of a pair of falcons:

1. Estimate percentages of different prey take in a sample.
2. Estimate biomass represented by estimate 1.
3. Estimate effect of such variables as temperature, metabolic demands, and food types.

This study indicates that food type alone can alter these estimates by a factor of more than 100 percent.

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Table 2. Diet values and food consumption of two New Zealand Falcons.

	Rabbit	Whole chick	Hare muscle	Whole birds	Whole mouse
Month of diet period	June	July	June	Oct.	Oct.
Number of days	14	13	12	14	14
Mean ambient temperature (°C)	9.3	8.0	10.2	11.5	11.1
Male					
Maintained body weight (g)	293	293	293	293	293
Mean daily food consumption (g)	45.5	45.6	38.7	37.8	30.6
% body wt. consumed/day	15.5	15.6	13.2	12.9	10.4
% body wt. consumed at 10°C	15.3	15.2	13.2	13.2	10.6
Food consumption (g/day) at 10°C	44.8	44.5	38.7	38.7	31.1
Wt. food (g) equivalent to 100 g mouse	144	143	124	124	100
Female					
Maintained body weight (g)	424	424	424	424	424
Mean daily food consumption (g)	55.4	56.9	48.6	39.7	34.0
% body wt. consumed/day	13.1	13.4	11.5	9.4	8.0
% body wt. consumed at 10°C	13.0	13.0	11.5	9.7	8.2
Food consumption (g/day) at 10°C	55.1	55.1	48.8	41.1	35.2
Wt. food (g) equivalent to 100 g mouse	157	157	139	117	100
Mean wt. (g) equivalent to 100 g mouse	151 ± 6	150 ± 7	132 ± 7	120 ± 4	100

A ROADSIDE RAPTOR CENSUS IN THE EASTERN GREAT BASIN–1973-1974

by
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Abstract

Roadside raptor surveys were conducted throughout a 12-month period in the eastern Great Basin of Utah. An index of relative abundance was calculated for each species of diurnal raptor present. Communal Bald Eagle roosts were checked routinely and numbers of eagles recorded.

Bald Eagle numbers appear to be stable, but the numbers of Golden Eagles and Ferruginous Hawks have declined since 1968. This decline is probably due to a drop in jackrabbit numbers. The available data do not allow the development of trends for the other raptor species.

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